



**Energy Audit Report
Rise Krishna Sai Gandhi Group of
Institutions - Ongole
Year-2022-23**



**ENERGY AUDIT REPORT
CONSULTATION REPORT**



**RISE KRISHNA SAI GANDHI
GROUP OF INSTITUTIONS
ONGOLE, VALLURU**

Andhra Pradesh- 523272

PREPARED BY

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(2022-23)



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ACKNOWLEDGEMENT

Empirical Exergy Private Limited (EEPL), Indore takes this opportunity to appreciate & thank the management of **Energy Audit Report Rise Krishna Sai Gandhi Group of Institutions, Ongole** for giving us an opportunity to conduct energy audit for the college .

We are indeed touched by the helpful attitude and co-operation of all faculties and technical staff, who rendered their valuable assistance and co-operation the course of study.



Rajesh Kumar Singadiya

(Director)


M.Tech (Energy Management), PhD (Research Scholar)
Accredited Energy Auditor [AEA-0284]
Certified Energy Auditor [CEA-7271]
(BEE, Ministry of Power, Govt. of India)
Empanelled Energy Auditor with MPUVN, Bhopal M.P.
Lead Auditor ISO50001:2011 [EnMS) from FICCI, Delhi
Certified Water Auditor (NPC, Govt of India)
Chartered Engineer [M-1699118], The Institution of Engineers (India)
Member of ISHRAE [58150]



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Certificate of Accreditation

 **BUREAU OF ENERGY EFFICIENCY**

Examination Registration No.: **EA- 7271**

Accreditation Registration No.: **AEA-284**



Certificate of Accreditation

This is to certify that Mr./Ms. **Shri. Rajesh Kumar Singadiya** having its trade/registered office at has been given accreditation as accredited energy auditor. The certificate shall be effective from **9th** day of **May, 2018**


The certificate is subject to the provisions of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

This certificate shall be valid until it is cancelled under regulation 9 of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

On cancellation, the certificate of accreditation shall be surrendered to the Bureau within fifteen days from the date of receipt of order of cancellation.

Your name has been entered at AEA No. **284** in the register of list of accredited energy auditors. Your name shall be liable to be struck out on the grounds specified in regulation 8 of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

Given under the seal of the Bureau of Energy Efficiency, Ministry of Power, this **5th** day of **October, 2018**


Secretary,
Bureau of Energy Efficiency
New Delhi



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Energy Audit Team

The study team constituted of the following senior technical executives from **Empirical Exergy Private Limited, Indore**

-  **Mr. Rakesh Pathak**, [Director & Electrical Expert]
-  **Mr. Rajesh Kumar Singadiya** [Director & Accredited Energy Auditor AEA-0284]
-  **Mr. Hemendra Khedekar** [Sr. Project Manager]
-  **Mr. Ajay Nahra** [Asst. Project Engineer]
-  **Mr. Charchit Pathak** [Project Engineer]
-  **Mr. Praveen Puniyasa**[Electrical Engineer]



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EXECUTIVE SUMMARY

The executive summary of the energy audit report furnished in this section briefly gives the identified energy conservation measures and other recommendation during the project that can be implemented in a phased manner to conserve energy, increase productivity inside the College campus.

ENERGY INICIATIVE TAKEN BY COLLEGE

✚ SOLAR SYSTEM

College has already installed 495 KWp grid connected solar rooftop-PV system. - **It's Appreciable.**

✚ LIGHTING SYSTEM

College has already installed 185 LED bulbs of rating 20W for power saving point of view- **It's Appreciable**

RECOMMENDATION

✚ TIMER CONTROLLED STREET LIGHTS

Installation of “Timer control on street lighting” in college campus is recommended.

✚ CEILING FAN AND EXHAUST FAN:

Replacement of “conventional ceiling fan (60 Watt to 80 Watt)” by energy efficient star rated fan or BLDC based energy efficient fan (20 to 25 Watt) in “admin building, class rooms, laboratories and faculties cabin” have great potential for energy saving.

Replacement of “conventional exhaust fan (90 Watt to 125Watt)” by energy efficient star rated fan or BLDC based energy efficient Fan (20 to 40 Watt) in old building class rooms, laboratories and faculties cabin have great potential for energy saving.

✚ IOT BASED ENERGY MONITORING SYSTEM AT MAIN FEEDER

Installation of “Cloud based (IoT based) energy monitoring system” including harmonic measurement (total voltage and current harmonic distortion %) in power house will be good initiate for energy monitoring as well as student demo project for management. Expected energy saving potential about 2 to 4%.



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✚ Installation of energy meters between transformer and main PCC panel with IOT system will monitor line losses of the system. It will give real time measurement of power factor and line losses from the cable.

✚ **Energy Management Workshop and Training:**

- ✚ Develop energy management policies for college. Establish a procurement policy that is energy saving and eco-friendly.
- ✚ Involve All Stakeholders- Encourage involvement of government, foundations, and industry in supporting interdisciplinary research, education, policy formation, and information exchange in energy management system.



CHAPTER-1 INTRODUCTION

1.1 About College

RISE Krishna Sai Gandhi Group of Institutions is one of the best institutions in the region of JNTUK, under the flagship of AICTE. It offers under graduate courses in Engineering. The Institution was established on 5th October 2009 by RISE which stands for Rural Institute of Social and Economic Empowerment. The captivating ambiance amidst panoramic scenic beauty all around would add glory to the face value of the campus. Since its inception, the institution has been flourishing in all aspects. RISE institution is bound together by a deep-rooted sense of excellence in education. Our commitment to quality in education, learning and research is uncompromising, and lived out in practice every day in our lecture halls, laboratories and libraries.

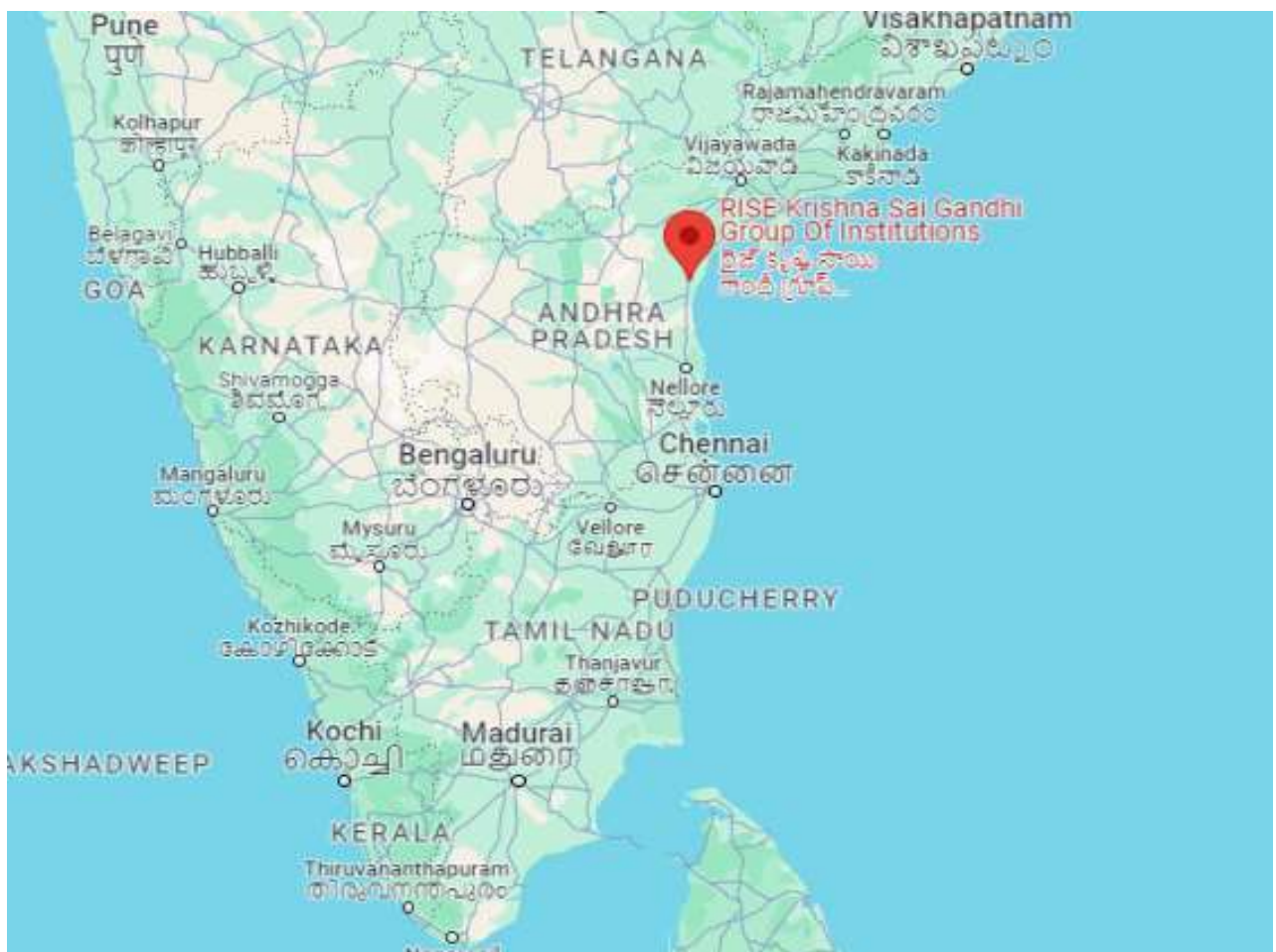


Fig.: 1.1 RISE Krishna Sai Gandhi Group of Institutions from Google map



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VISION

"To create a community of engineers who blend ground breaking technologies with ethical responsibility, driving global innovations while championing sustainable solutions and community empowerment."

MISSION

M1: Foster an inclusive academic setting that combines cutting-edge technology with ethical grounding.

M2: Inspire sustainable innovation by embedding environmental and social responsibility into our curriculum.

M3: Strengthen ties with industry and communities to ensure our engineers make a real world impact.

CORE VALUES



Integrity: Upholding honesty and ethical standards in all endeavors.

Innovation: Encouraging creative thinking and cutting-edge solutions.

Collaboration: Promoting teamwork and interdisciplinary partnerships.

Excellence: Striving for the highest quality in education and research.

Responsibility: Committing to sustainable practices and community betterment.

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1.2 College Build-Up Area

S. No.	Area	Area in sq. m.
	Total Campus Area	41,197 sq. m.
	Buildup area in campus	9910 sq. m.

1.3 College Population

S. NO.	Category	Total Numbers
1	Total No. of Student	1027
2	Total No. of Teaching Faculty	71
3	Total No. of Non-Teaching Staff	57



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1.4 College Layout

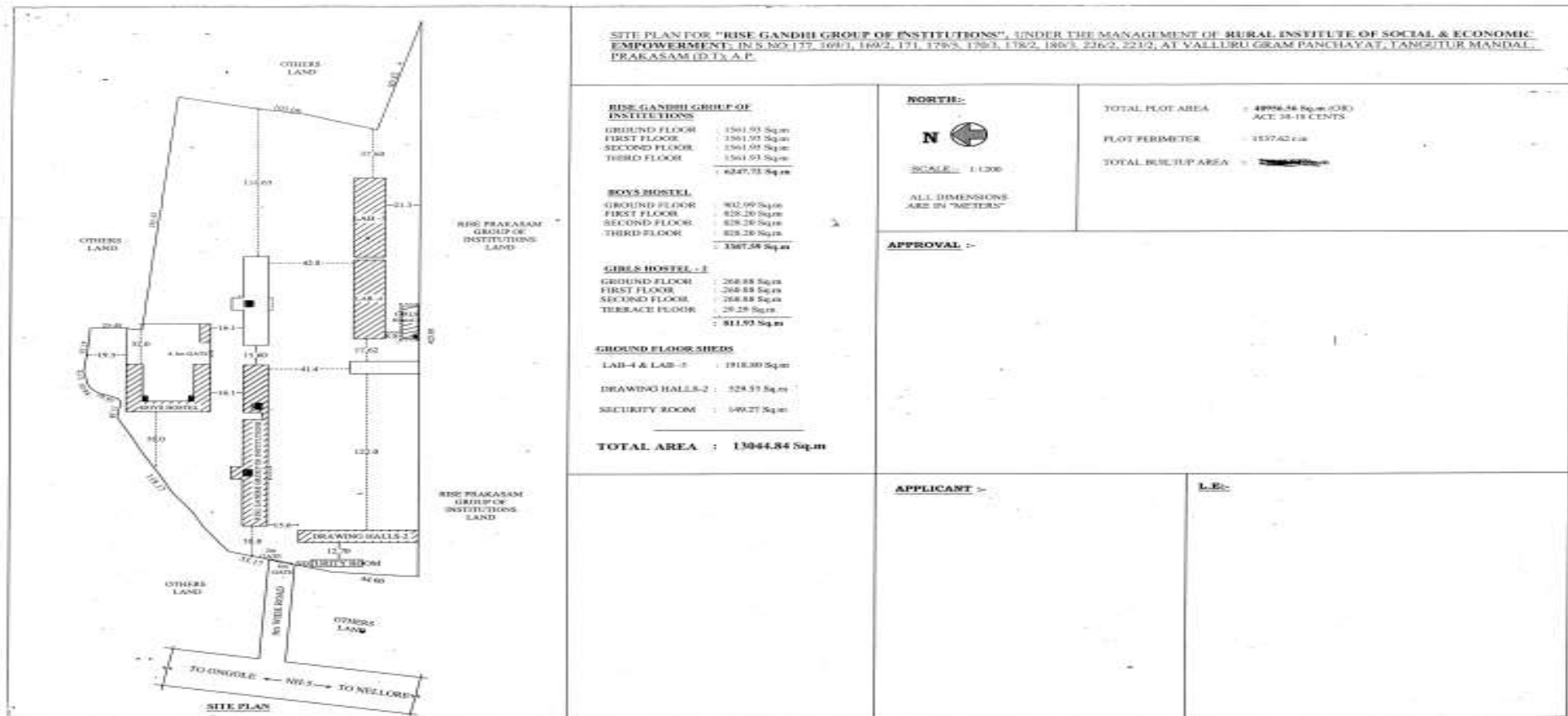


Fig.: 1.2 College Campus Layout



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1.5 Aims & Objectives of College

- ✚ The college aims at personalized training of young men and women through Integral Pedagogy – Context, Experience, Reflection, Action and Evaluation –to be well motivated teachers who would be intellectually competent, morally upright, socially committed and spiritually inspired.
- ✚ It is the aim of the college that the students who take their training here become well-formed guides with human qualities (pupil-teachers with human touch). The college, therefore, offers an all-round training, one that is at once intellectual, cultural, social, emotional, physical, aesthetic, moral and spiritual.
- ✚ The college further aims at promoting values such as respect for Indian common cultural heritage, egalitarianism, democracy, secularism, national unity, respect for religious and moral values gender equality, environment protection, removal of social barriers, responsible use of cybernetics & mass media, transparency and probity in private and public life.

Particulars of services of the Teachers' Training College:

- ✚ Personalized training through Integral Pedagogy and mentoring.
- ✚ All round training that is intellectual, cultural, social, emotional, physical, aesthetic, moral and spiritual.
- ✚ In-service training for teachers.
- ✚ Use of IT communication media and innovative practices.
- ✚ Documentation and research.
- ✚ Environment education for sustainability.
- ✚ Empowerment of women.



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Green Audit Committee

**RISE KRISHNA SAI GANDHI GROUP OF INSTITUTIONS**
(Approved by AICTE, New Delhi and affiliated to JNTUK, Kakinada)
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Dr. K.V. Subrahmanyam
M.Tech, Ph.D, MISTE, FIE, FIETE.
Principal

Dt. 05.06.23

Constitution of Committee for Energy/Environment/Green

In view of Environment impact assessment & procedure for situation urgent action regarding regular assessment of pollution soil degradation & waste management following committee are required to be constituted for saving the environment w.e.f. date of issue, for the period of three years.

Name of the Committee	Proposed name of the members
1. Energy Audit	1. Smt M.Şireesha 2. Smt B Lavanya 3. Mr Naga Suresh
2. Environmental Audit	1. Mr N Madhu Babu 2. Mr V Anjaneyulu 3. Mr P Rajasekhar
2. Green Audit	1. Mr.S V Ravi Kumar 2. Mrs. Silaja 3. Sk Meeravali


IQAC Co-ordinator
IQAC Co-ordinator

Principal

(Dr K V Subrahmanyam)
PRINCIPAL
RISE KRISHNA SAI GANDHI
GROUP OF INSTITUTIONS
VALLURU:: ONGOLE.

Promoted by
Rural Institute of Social & Economic Empowerment (RISE)



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1.6 About Energy Audit

Energy audit helps to understand more about the ways energy is used in any plant and helps in identifying areas where waste may occur and scope for improvement exists. The overall energy efficiency from generation to final consumer becomes 50%. Hence one unit saved in the end user is equivalent to two units generated in the power plant.

Energy audit is the most efficient way to identify the strength and weakness of energy management practices and to find a way to solve problems. Energy audit is a professional approach in utilizing economic, financial, and social and natural resources responsibility. Energy audits “adds value” to management control and is a way of evaluating the system.

Empirical Exergy Private Limited (EEPL), Indore M.P. carried out the “**Energy Audit**” at the site to find gaps in the energy consumption pattern for **RISE Krishna Sai Gandhi Group of Institutions**. A technical report is prepared as per the need and the requirement of the project.

1.7 Objectives of Energy Auditing

An energy audit provides vital information base for overall energy conservation program covering essentially energy utilization analysis and evaluation of energy conservation measures. It aims at:

- ✚ Identifying the quality and cost of various energy inputs.
- ✚ Assessing present pattern of energy consumption in different cost centers of operations.
- ✚ Relating energy inputs and production output.
- ✚ Identifying potential areas of thermal and electrical energy economy.
- ✚ Highlighting wastage in major areas.
- ✚ Fixing of energy saving potential targets for individual cost centers.
- ✚ Implementation of measures for energy conservation & realization of savings.



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1.8 Methodology

Methodology adopted for achieving the desired objectives viz.: Assessment of the current operational status and energy savings include the following:

- ✚ Discussions with the concerned officials for identification of major areas of focus and other related systems.
- ✚ Team of engineers visited the site and had discussions with the concerned officials / supervisors to collect data / information on the operations and load distribution within the plant and same for the overall premises. The data was analyzed to arrive at a base line energy consumption pattern.
- ✚ Measurements and monitoring with the help of appropriate instruments including continuous and / or time-lapse recording, as appropriate and visual observations were made to identify the energy usage pattern and losses in the system.
- ✚ Trend analysis of costs and consumptions.
- ✚ Capacity and efficiency test of major utility equipment's, wherever applicable.
- ✚ Estimation of various losses
- ✚ Computation and **in-depth analysis** of the collected data, including utilization of computerized analysis and other techniques as appropriate were done to draw inferences and to evolve suitable energy conservation plan/s for improvements/ reduction in specific energy consumption.

1.9 Present Energy Scenario in college Campus

- ✚ The college uses energy in the form of electricity purchased from Andhra Pradesh Central Power Distribution Corporation Limited. The total billing amount of **RISE Krishna Sai Gandhi Group of Institutions** is **Rs. 31,39,779/-** concerning annual energy consumption **3,97,452** units analysis period from Jul-2022 to Jun-2023.
- ✚ The annual average per unit charges paid by the college is **Rs. 7.90** per unit.
- ✚ College has installed power backup Solar System of capacity 495 KWp.
- ✚ College has power backup for grid failure DG Set of power 250 KVA.

CHAPTER- 2

POWER SUPPLY SYSTEM

2.1 Grid Power Supply System

The power supply for **RISE Krishna Sai Gandhi Group of Institutions** is from Andhra Pradesh Central Power Distribution Corporation Limited by 11 kV feeders with Sanctioned load 150 KVA.

Table: 2.1 Grid connection details

Division	Vijay Wada
Sub Division	Valluru
Sanctioned Load	150 KVA
Feeder	11 KV

2.2 Solar Supply System

Grid Connected Solar Photovoltaic System

There are 1547 solar panels in college campus each panel capacity 320 Wp. Solar photovoltaic roof top systems installed on building roof .System details are given below:

Table: - 2.2 Solar plants technical detailed

Sr. No	Description	Technical Specification
Plant Information		
1	Locations	Building Terrace
2	Panel Type	Poly-crystalline
3	Panel Wattage	320 Wp
4	No of PV Panels	1547
5	No. of Inverters	16
6	Per Day Generation(kWh)	1980
	Total Solar Plant Capacity	495 KWp



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Fig.: 2.1- Solar Plant Installation on College rooftop

Observation: - College has installed 1547 solar panels on building top and utilized to solar energy in college premises. Each panel capacity is 320 Wp.

2.3 DG Set Supply System

Table: - 2.3 DG Set technical details

S.No.	Technical Terms	Technical Specification
1	DG Set Capacity (KVA)	250
2	Make	Kirloskar
3	Voltage (V)	415
4	Current (A)	374.8
5	RPM	1500
6	Frequency (Hz)	50
7	Phase	3
8	Power Factor(PF)	0.8



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Fig.: 2.2- 250 KVA DG Set installed in college campus



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**CHAPTER- 3
ELECTRICITY BILL ANALYSIS**

3.1 Monthly Electricity Bill Analysis year 2022-23

The monthly electricity bills are provided by college and visibility of bill the monthly electrical energy consumption year 2022-23.

Table 3.1 Energy consumption and billing amount Year-2022-23

Sr. No.	Month & Year	Total Unit Consumption (kWh)	Total Amount (Rs.)	Per Unit Charges (Rs./kWh)
1	Jul-22	27728	182107	6.57
2	Aug-22	28720	207751	7.23
3	Sep-22	26756	163798	6.12
4	Oct-22	32792	275977	8.42
5	Nov-22	40120	329541	8.21
6	Dec-22	40968	419216	10.23
7	Jan-23	36356	285082	7.84
8	Feb-23	30304	112492	3.71
9	Mar-23	31400	173077	5.51
10	Apr-23	35892	347400	9.68
11	May-23	33996	322998	9.50
12	Jun-23	32420	320340	9.88
Total Unit		3,97,452	31,39,779/-	7.90

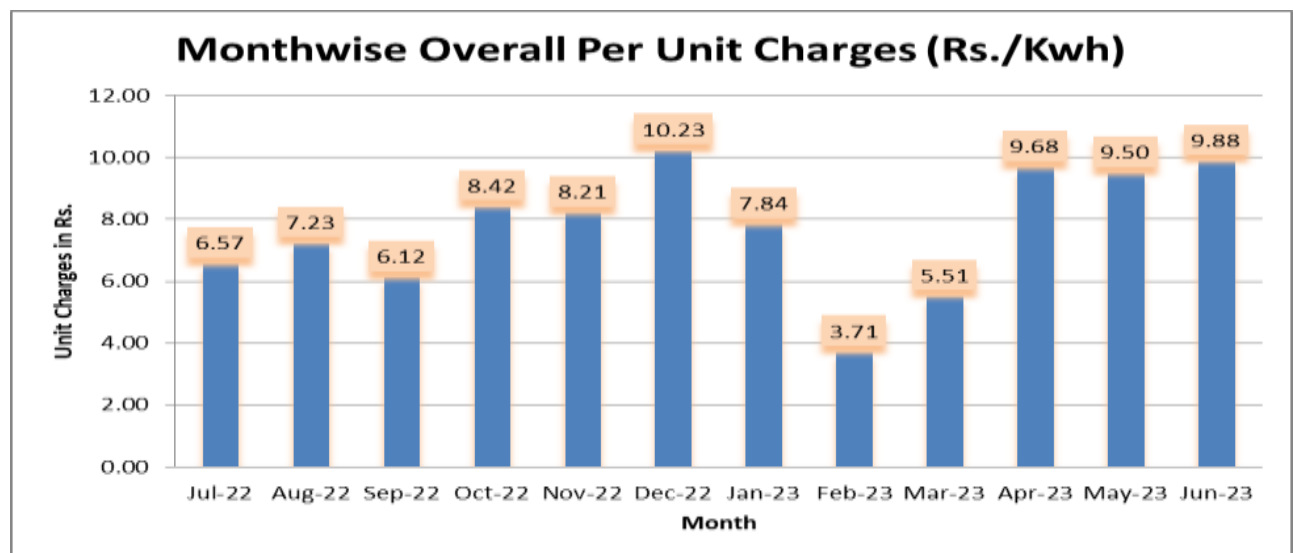


Fig.-3.1 Monthly per unit charges year-2022-23

Observation:

The average energy charge is Rs 7.90 /kWh. Maximum charge Rs. 10.23/kWh in month of Dec-22 & minimum Rs. 3.71/kWh in month of Feb-23.



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3.2 Connected Electrical Load of College

S.No.	NAME OF THE EQUIPMENT	QUANTITY	RATING OF EACH EQUIPMENT (WATTS)	TOTAL RATING (WATTS)
1	FAN	242	80	19360
2	TUBE LIGHT	416	40	16640
3	LED BULB	185	20	3700
4	PROJECTOR	19	700	13300
5	COMPUTER	373	150	55950
6	PRINTER	8	500	4000
7	XEROX MACHINE	2	1650	3300
8	AIR CONDITIONER	8	1500	12000
			TOTAL RATING (KW)	128.25

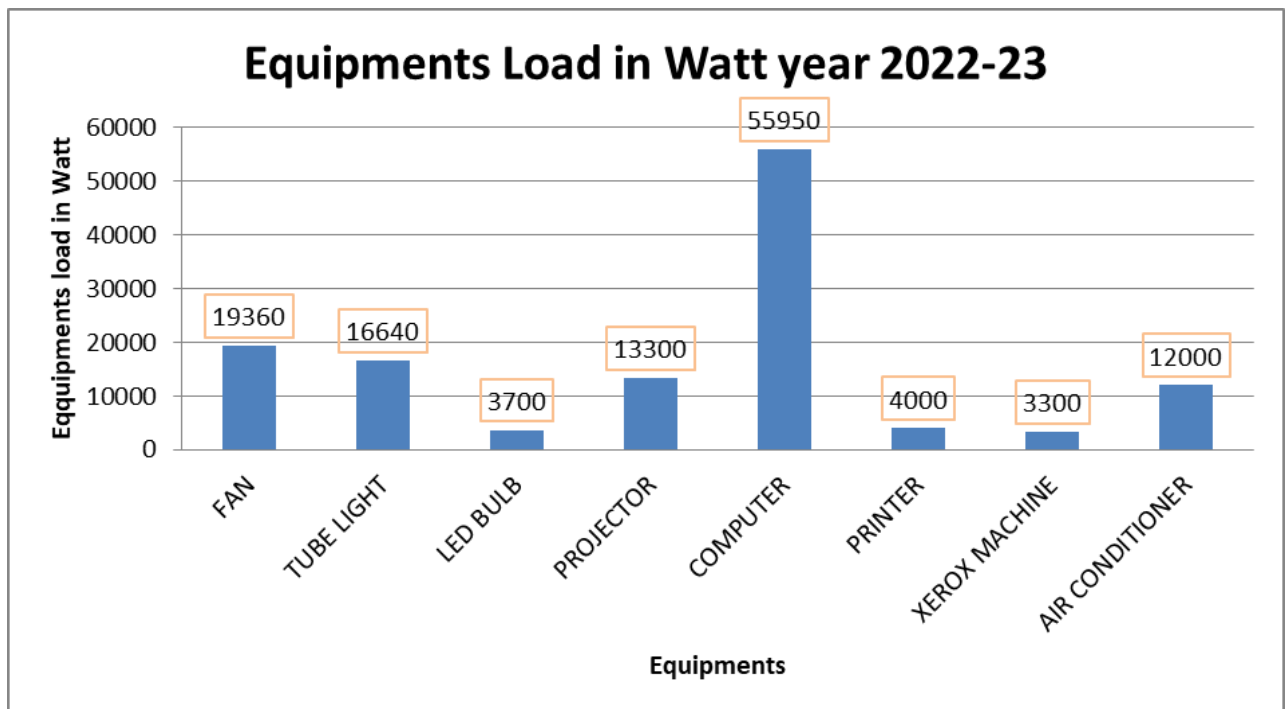


Fig.: 3.2 Bar graph of electrical equipments energy consumption year 2022-23

Observation: It is observed that total electrical equipments load in college campus around 128.25 kW. There are good scope to save power by replacing conventional equipment's like Tube light, ceiling Fan.



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3.3 Load sharing of connected load in college campus

S.NO	NAME OF THE EQUIPMENT	TOTAL NO. OF EQUIPMENTS	RATING OF EACH EQUIPMENT (WATTS)	TOTAL RATING (Watt)	Load Sharing %
1	FAN	242	80	19360	15.10
2	TUBE LIGHT	416	40	16640	12.97
3	LED BULB	185	20	3700	2.88
4	PROJECTOR	19	700	13300	10.37
5	COMPUTER	373	150	55950	43.63
6	PRINTER	8	500	4000	3.12
7	XEROX MACHINE	2	1650	3300	2.57
8	AIR CONDITIONER	8	1500	12000	9.36
			TOTAL RATING (W)	128250	100

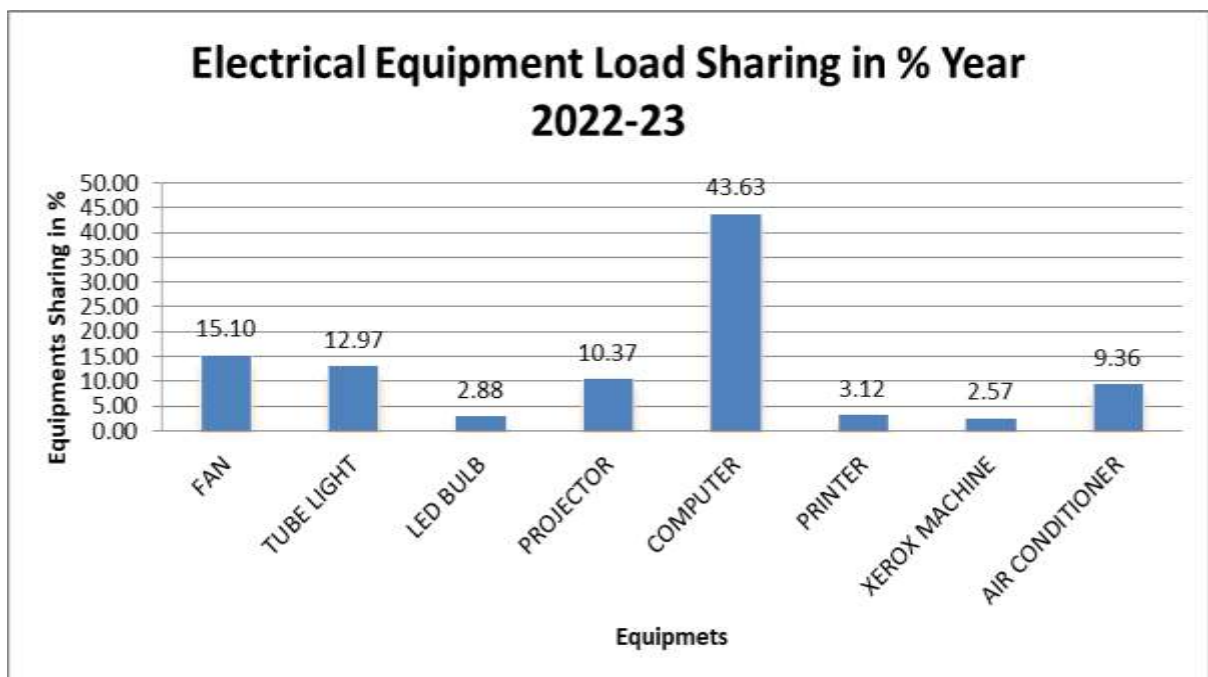


Fig.: 3.3 Graphical Presentation of connected load sharing Year 2022-23



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3.4 Some Photograph of Electrical Equipment's



Fig.: 3.4 Electrical Equipments in Institute



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Fig.: 3.5 Electrical Equipments in Institute

CHAPTER- 4

ENERGY CONSERVATION MEASURES

4.1 Case Study-01

Replacement of 80W conventional ceiling Fans by 28W BLDC Energy efficient ceiling fans in phase manner.

Table: 4.1 Details of energy saving 28 W BLDC ceiling fans

Sr. No	Item	Parameter	Unit
1	Rated Power of Ceiling Fan	80	Watt
2	No. of Ceiling Fans	242	Nos
3	Working Hrs./Day	8	Hrs./Day
4	Working Days/Year	250	Days/Year
5	Energy Efficient BLDC Fan Rated power	28	Watt
6	Energy Saving Potential	25,168	kWh/Year
7	Load Factor	0.8	%
8	Expected Annual Energy Saving	20,134	kWh/Year
9	Per Unit Charges	7.90	Rs/kWh
10	Expected Money Saving	15,9,058	Rs./Year
11	Cost of New Ceiling Fan	2,500	Rs./Pices
12	Investment on New BLDC 100 Fans Purchasing	6,05,000	Rs.
13	Maintenance Investment@2%	12,100	Rs.
14	Total Investment	6,17,100	Rs.
15	Simple Pay Back Period	3.8	Years

Note:- Energy savings depend on the operation hour per day and the load factor of the system.

Observation: It is noted that the total conventional ceiling Fans in college premises are 242 of 80 Watt, they consumed total power 38,720 units/year. After replacement power consumption by 28W BLDC Fans are 20,134 units/year.

Total investment on replacement is 6.17 Lakh and annual saving 1.59 Lakh; total investment cost payback period is 3.8 years.

4.2 Case Study-02

Replacement of 40 W conventional Tube lights by 28 W LED Energy efficient Tube lights in Phase manner.

Replacing (40W) Tube lights with Energy Efficient LED Tube lights (28W)			
Calculation on Existing System			
1	Tube light	No.	416
2	Rated power	Watt	40
3	Operating Hrs.	Hrs./day	8
4	Operating annual Days	Days/Year	250
5	Unit consumed annually	kWh/Year	33,280
Calculated Saving after replacement			
1	Replacement with LED Tube light	Watt	28
2	Unit consumed annually after replacement	kWh/Year	23,296
3	Total Energy Saving	kWh/Year	9,984
4	Total annual energy cost saving @ Rs.7.9 per unit	INR	78,873/-
Calculated on existing system			
1	Capital Cost (Rs.200/- per LED Tube light)	INR	83,000
2	Maintenance investment @ 0%	INR	0
3	Total investment	INR	83,000
4	Simple payback (Investment/annual savings)	Years	1

Note: - Energy savings depend on the operation hour per day and the load factor of the system.

Observation: It is noted that the total conventional Tube lights in college premises are 416 of 40 Watt; they consumed total power 33,280 units/year. After replacement power consumption by 28W BLDC Fans are 23,296 units/year.

Total investment on replacement is 83,000/- and annual saving 78,873/-; total investment cost payback period is 1 years.



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**END OF THE REPORT
THANKS**